
A New Lithophytic *Orthophytum* (Bromeliaceae) from the Espinhaço Range, Minas Gerais, Brazil

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ABSTRACT. *Orthophytum itambense* Versieux & Leme is described and illustrated as a new species, with an endemic distribution restricted to Pico do Itambé State Park, Minas Gerais, Brazil. This new lithophytic taxon is closely related to *O. supthutii* E. Gross & Barthlott due to the shape and texture of leaves, floral bracts with recurved apex, sessile inflorescence, and by the long tubular corolla. The new species differs from its closest relatives by having leaves white-lepidote abaxially and adaxially, with trichomes forming white transverse cross-bands adaxially, nearly free sepals, white corolla, and shorter petal appendages (only to 4 mm vs. to 7 mm in *O. supthutii*).

Key words: Bromeliaceae, Espinhaço range, IUCN Red List, Minas Gerais, *Orthophytum*.

The number of species of *Orthophytum* Beer has greatly increased since the publication of the last monograph on subfamily Bromelioideae (Smith & Downs, 1979). These authors recognized 17 species, while Luther (2004) lists 35 species for the genus, and the number is now elevated to 47 after studies by Leme (2004a, b), Leme and Machado (2005, 2006), Leme and Paula (2003, 2005), Wanderley and Conceição (2006), and the new species proposed here. Despite the number of new taxa described in the past decades, a modern revision of the genus is still lacking.

Orthophytum is endemic to eastern Brazil, with the center of diversity along the Espinhaço range in Bahia (15 species) and Minas Gerais (7 species) states. Secondary centers occur in the northeastern portion of Minas Gerais state, where at least 13 species occur, restricted to inselbergs, and in the central-north portion of Espírito Santo (7 species). Two additional species range northeast into the adjacent states of Paraíba, Pernambuco, and Alagoas.

Orthophytum grows in sunny and dry habitats or on constantly humid rocks near streams and waterfalls in grasslands on rocky soils in cerrado, among rocks or

on rock outcrops inside the dry woodland caatinga, as well as in the Atlantic forest domains.

Orthophytum itambense Versieux & Leme, sp. nov.

TYPE: Brazil. Minas Gerais: Santo Antônio do Itambé, Parque Est. do Pico do Itambé, margem esquerda do Rio Preto, próximo à cachoeira da Fumaça, ca. 850 m, 29 Ago. 2003, L. M. Versieux 149 & A. P. G. Faria [fl in cultivation, Botany Res. Greenhouse, Univ. Fed. do Rio de Janeiro, 21 Ago. 2004] (holotype, HB; isotypes, BHC, RFA, SEL, SP). Figures 1, 2C–F, 3.

Species nova *Orthophyto supthutii* E. Gross & Barthlott affinis sed laminis foliorum supra albo-zonatis, sepalis subliberis et etiam petalis albis base appendicibus brevioribus differt.

Plant lithophytic, forming mats, 9 cm high when flowering, short-caulescent, propagating by elongated basal stolons; stolons ca. 10 cm × 3 mm, covered by reduced light brown, narrowly triangular cataphylls, ca. 1.5 cm. Leaves ca. 30, suberect to spreading, arcuate-recurved toward apex at anthesis; leaf sheaths widely ovate-elliptic, 1–1.5 × 2–2.5 cm, glabrous, lustrous, pale yellow becoming greenish yellow and spinulose toward apex; leaf blade narrowly triangular, apex soft, filiform-caudate, (8.5–)12–21 × (0.6–)1–1.7 cm, green, slightly canaliculate toward base, thinner in texture and nearly flat toward apex, abaxially distinctly nerved, subdensely to densely white-lepidote, trichomes asymmetrical, arranged along the midnerves, not obscuring leaf color, adaxially trichomes forming white cross-bands, margins spinulose, spines triangular-uncinate, distinctly antrorse, yellowish green toward apex, 0.5–1 mm long, 2–4 mm apart. Inflorescence sessile, pseudosimple to inconspicuously bipinnate, inconspicuously subcorymbose, sunk in the center of the rosette, ca. 4 × 3 cm, ca. 20-flowered; primary bract foliaceous, gradually reduced in size inward, 7–13 × 1.5–2 cm, becoming yellowish green

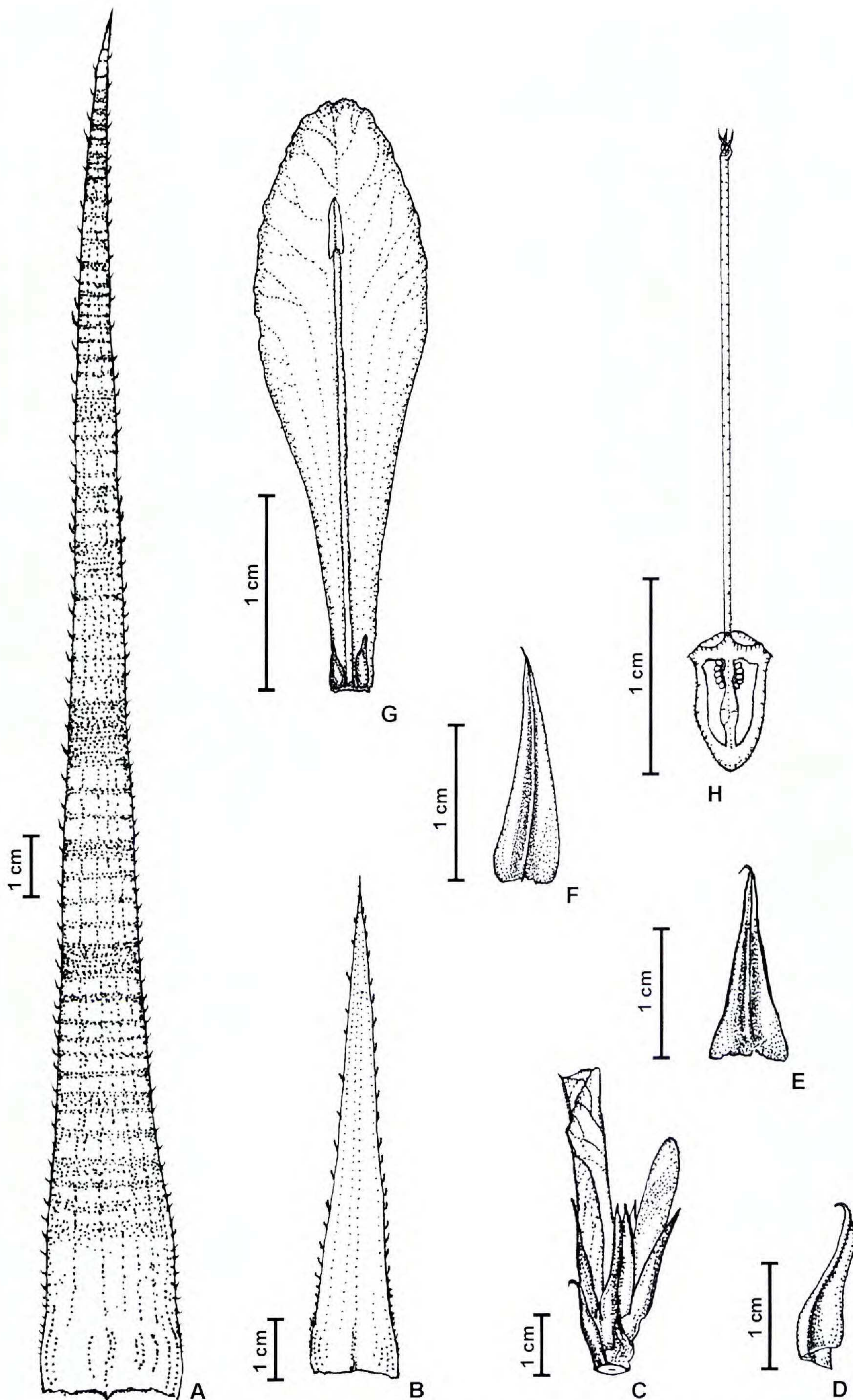


Figure 1. *Orthophytum itambense* Versieux & Leme. —A. Leaf. —B. Primary bract. —C. Fascicle showing a mature flower and a bud. —D. Floral bract, side view. —E. Floral bract, front view. —F. Sepal. —G. Petal and stamen. —H. Stigma, style, and longitudinal section of ovary. Drawn by Leonardo M. Versieux from the holotype, *L. M. Versieux 149* (HB).

or reddish green at anthesis; fascicles ca. 13, inconspicuous, 1- to 2-flowered, ca. 4.3×1 cm, compressed, nearly sessile, peduncle complanate, ca. 1×5 mm; floral bract narrowly triangular, apex

acuminate with a recurved apiculus, $11 \times 5-6$ mm, membranaceous, glabrous, finely nerved, entire, sharply carinate. Flowers 38–40 mm, sessile or nearly so, odorless or with soft sweet smell, diurnal; sepals

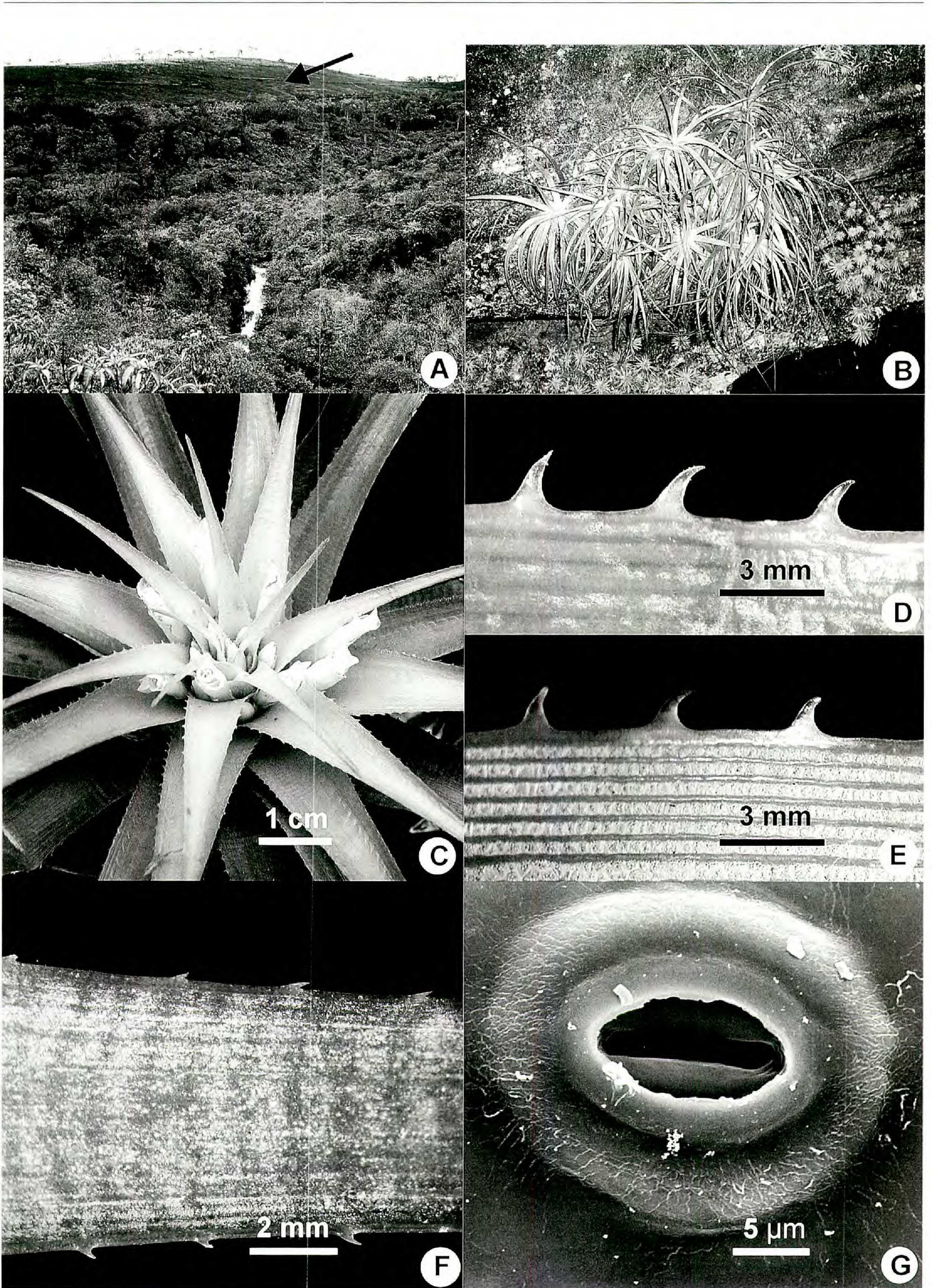


Figure 2. *Orthophytum itambense* Versieux & Leme. —A. Overview of the type-collection locality, showing the gallery forest and land clearing on the top (indicated by arrow). —B. A mat of *O. itambense* overhanging a quartzite outcrop. —C. Adult blooming specimen. —D. Adaxial leaf blade, stereomicroscopic view showing the triangular-uncinate spines. —E. Abaxial leaf blade, stereomicroscopic view showing white trichomes organized in rows, between nerves. —F. Adaxial leaf blade, stereomicroscopic view showing the trichomes forming white transverse cross-bands. —G. SEM image of abaxial epidermis showing one projected stomate. C–G from the holotype, *L. M. Versieux 149* (HB).

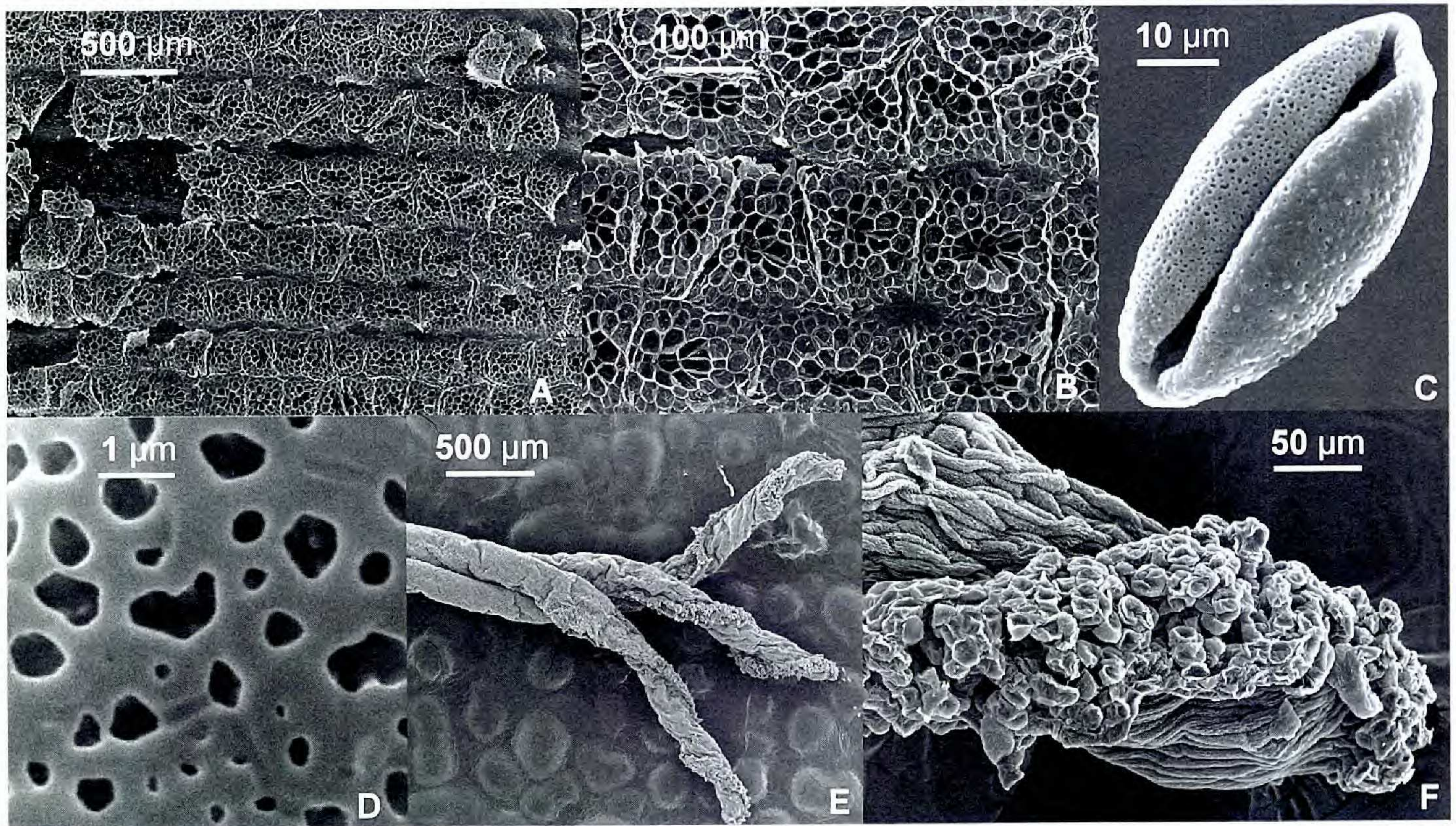


Figure 3. SEM images of different structures of *Orthophytum itambense* Versieux & Leme. —A, B. Abaxial epidermis showing the asymmetric trichomes. —C. Pollen grain. —D. Detail of the pollen grain reticulate exine. —E. ConduPLICATE-spiral post-anthesis stigma. —F. Globose papillae on the edges of stigma lobes. From the holotype, *L. M. Versieux 149* (HB).

narrowly triangular-lanceolate, apex acuminate-attenuate, 14–15 × 3–4 mm, connate at base for ca. 1 mm, symmetric or nearly so, glabrescent, finely nerved, erect, white, membranaceous, entire, sharply carinate; corolla erect and tubular at anthesis, petals subspatulate, apex subobtusate and inconspicuously emarginate, 30–32 × 10 mm, free, glabrous, white, bearing at base 2 sublinear-lanceolate, acuminate to irregularly bidentate appendages, 3–4 × 1 mm; stamens included, filaments 16–20 mm, terete, white, free or nearly so, anthers oblong, ca. 2 mm, base slightly sagittate, apex minutely apiculate, dorsifixed near the base; pollen grains single, ellipsoid, monocolpate, exine reticulate, ca. 60 × 22 µm; ovary obovate, trigonous, 6 × 4–5 mm, white, glabrous, epigynous tube ca. 1 mm, placentation axile; style included, white, distinctly surpassing the anthers, 28–30 mm; stigma conduPLICATE, weakly spiral, 2–3 mm, white, inconspicuously papillose; ovules numerous, obtuse, restricted to upper 1/3 of the ovary locule. Fruits white becoming green toward apex, fleshy, trigonous, ca. 8 × 4 mm; seeds ca. 10, elliptic to ovoid, ca. 2 × 0.8 mm, yellowish white.

Orthophytum itambense can be distinguished from the most similar taxon, *O. supthutii* in several characteristics as pointed out in the following key:

1a. Leaf blade glabrous and lustrous on the adaxial surface; sepals unequally connate at base for 2–5 mm; petals orange-yellow, petal appendages 5–7 mm long *O. supthutii*

1b. Leaf blade with trichomes forming white cross-bands on the adaxial surface; sepals nearly free, connate at base for ca. 1 mm only; petals white, petal appendages 3–4 mm long *O. itambense*

Orthophytum supthutii may be misidentified as *Cryptanthus schwackeanus* Mez in herbaria, although the latter can be distinguished from both *O. supthutii* and *O. itambense* by its elliptic petals connate by 2–3 mm without appendages.

Leaf anatomy has also indicated several differences that can be used to separate *Orthophytum itambense* from *O. supthutii*. First, the adaxial hypodermis of *O. itambense* has four to five layers, and the first two of these layers have thickened, lignified cell walls. The hypodermis of *O. supthutii* consists of five to six layers of cells, and only the first one has cells with thickened, lignified walls. Second, in *O. itambense* the chlorenchyma is located in the inner half of the mesophyll with seven to eight layers, and in *O. supthutii*, while it has similar chlorenchyma, there are 10 to 11 cell layers. Third, peltate trichomes in *O. itambense* have a stalk composed of three basal cells, while in *O. supthutii* it is composed of only two basal long cells. Finally, in the abaxial epidermis, stomata are projected in *O. itambense* (Fig. 2G), while they are only weakly projected in *O. supthutii* (Souza, pers. obs.).

Leme (2004a) proposed a provisional division for *Orthophytum* into two complexes and six subcomplexes of species, in which *O. supthutii* was segregated alone in subcomplex *supthutii* by its stemless habit,

the similar color of the inner and outer leaves at anthesis, sessile inflorescence, and by the unusual bright orange-yellow petals. In fact, *O. supthutii* has been an intriguing species mainly because of its orange-yellow petals, with no obvious, closely related taxon within the genus, and thus the basis for the Gross and Barthlott (1990) suggestion that a new subgenus be created for this species. The inclusion of *O. itambense* as the second species in this subcomplex *supthutii* provides new impetus for further analyses of these two unique taxa and a better understanding of their position in the genus.

Distribution, habitat, and conservation status. *Orthophytum itambense* grows on quartzite outcrops at ca. 850 m elevation and is usually associated with Eriocaulaceae, Velloziaceae, and Xyridaceae species. It grows inside gallery forest at shaded and moist spots along the margins of Rio Preto, cachoeira da Fumaça, in Pico do Itambé State Park, located at Santo Antônio do Itambé (Figs. 2A, B). Despite being under legal protection, Pico do Itambé State Park still suffers environmental aggressions such as fires from adjacent agricultural areas. These fires can reach gallery forests, especially during the dry season (winter). Land clearing is also a problem around the protected area, thus compromising the natural populations of *O. itambense* and its habitat.

Similar conservation problems affect its closest relative, *Orthophytum supthutii*, which also has a restricted distribution even within the limits of its area of occurrence at the Cipó range (Leme, 1995) about 100 km south from Santo Antônio do Itambé. According to Gross and Barthlott (1990) and Rauh and Gross (1990), *O. supthutii* grows as a lithophyte on vertical rocky walls in deciduous forests or under full sun on rocky soil at altitudes above 1000 m.

Based on the IUCN criteria (IUCN, 2001), *Orthophytum itambense* and *O. supthutii* can be given the conservation status of Critically Endangered CR B1ab(ii, iii) and Endangered EN B1ab(ii, iii), respectively, due to their restricted occurrence area, habitat loss, and small population size. This situation enforces further distribution analyses and conservation projects with these taxa.

Paratypes. BRAZIL. **Minas Gerais:** Santo Antônio do Itambé, Parque Est. do Pico do Itambé, cachoeira da Fumaça, ca. 876 m, 16 Dec. 2005, R. B. Louzada 6, L. M. Versieux & A. M. Calvente (SP), ca. 830 m, 10 Oct. 2006, L.

M. Versieux 302, A. M. Calvente & R. B. Louzada (MO, SEL, SPF).

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